

### ABSTRACT OF THE DISCLOSURE

Non-naturally occurring mutant hemoglobins rHb ( $\beta$ N108Q) and rHb ( $\beta$ L105W) are provided that have a lower oxygen affinity than that of native hemoglobin, but high cooperativity in oxygen binding. rHb ( $\beta$ N108Q) also exhibits enhanced stability against autoxidation. The mutant hemoglobins are preferably produced by recombinant DNA techniques. Such mutant hemoglobins may be used as a component of a blood substitute and hemoglobin therapeutics.